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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,103	03/10/2004	Hiroshi Takiguchi	119037	2367

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OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
STEELE, AMBER D	

ART UNIT	PAPER NUMBER
1639	

MAIL DATE	DELIVERY MODE
12/03/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/796,103	TAKIGUCHI ET AL.	
	Examiner	Art Unit	
	Amber D. Steele	1639	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-18* is/are pending in the application.

4a) Of the above claim(s) *10* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9 and 11-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of the Claims

1. The preliminary amendment received on March 10, 2004 amended claim 19.

The amendment to the claims received on August 29, 2007 amended claims 1, 2, 5, 18, 20, and 21 and canceled claims 24-25.

The amendment to the claims received on February 29, 2008 amended claims 1-4, 6-7, 9, 11-12, 14-16, and 18 and canceled claims 8 and 19-25.

The amendment to the claims received on August 18, 2008 amended claims 1 and 18.

Claims 1-7 and 9-18 are currently pending.

Claims 1-7, 9, and 11-18 are currently under consideration.

Election/Restrictions

2. In the replies received on November 27, 2006 and March 9, 2007, applicants elected with traverse a probe according to claim 3 wherein L^3 is a C_6 alkylene group and L^4 is a polyethylene glycol phosphate group as the species of probe; a compound according to formula (I) wherein L^1 is a C_6 alkylene group, L^2 is a single bond, and R is a hydroxyl group as the species of compound; and HS are hydrogen and sulfur, respectively. Claim 10 is withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim.

Priority

3. The present application claims foreign priority to JP 2003-086362 filed March 26, 2003. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have

been placed of record in the file. However, a translation of JP 2003-086362 has not been provided.

Invention as Claimed

4. A method for immobilizing nucleic acid on a solid phase substrate comprising: (a) forming a composition comprising a total concentration of 0.1 to 2 μM of a nucleic acid as a probe and a compound or a salt thereof wherein the compound has a formula represented by HS-L^1-L^2-R wherein L^1 is a single bond or a C_{1-15} alkylene group; L^2 is a single bond, a nucleic acid, a polyethylene glycol group, -CO-NH-, or –NH-CO-; and R is a hydroxyl group, an amino acid group, a ferrocenyl group, or a carboxyl group, and L^1 and L^2 are not both single bonds, (b) then bringing the solid phase substrate into contact with the composition, and (c) incubating the composition in contact with a surface of the solid phase substrate to immobilize the nucleic acid and a compound or the salt thereof on the solid phase substrate by co-adsorption wherein the composition comprises a nucleic acid and a compound represented by formula I at a ratio of 40/60 to 60/40 and variations thereof.

Maintained Rejections

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1-7, 9, and 11-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson et al., "The effect of surface probe density on DNA hybridization", Nucleic Acids Research 29(24): 5163-5168, 2001.

For present claims 1, 6-7, 9, 11-12, and 18, Peterson et al. teach methods for immobilizing nucleic acids on a solid phase substrate comprising (a) contacting a duplex comprising a nucleic acid probe (i.e. ssDNA) and ssDNA-C6-SH (i.e. compound of formula HSC_6-nucleic acid or HS-L^1-L^2-R wherein L^1 is C_6, L^2 is a single bond, and R is natural hydroxyl on 3' end of nucleic acid; duplex is 50:50 ratio) with a solid support and (b) incubating the probe, compound, and solid support wherein the concentration of the probe, target, and duplex solutions are 1 μM (please refer to entire document particularly Table 1 and Materials and Methods section). In addition, Peterson et al. teach mercaptohexanol (i.e. $HS(CH_2)_6OH$ wherein HS-C_6-nucliec acid is a nucleic acid attached to MCH thus creating a 50:50 ratio; please refer to entire document particularly Materials and Methods section). Further regarding the 40/60 to 60/40 ratio limitation, applicants are respectfully directed to MPEP § 2144.05, section II. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, it is noted that applicants disclosure states that the ratio can be from 1:99 to 99:1 depending on the desired density of nucleic acids on the surface (please refer to the present specification page 9).

For present claim 2, Peterson et al. teach ssDNA as the nucleic acid probe (please refer to entire document particularly Table 1).

For present claims 3-4, Peterson et al. teach 5' end of the nucleic acid probe as formula of HSC_6single bond or HSC_6spacer (e.g. HS-L3-L4 wherein L3 is C6 and L4 is a single bond or spacer; please refer to entire document particularly Table 1).

For present claim 5, Peterson et al. teach a probe with nucleic acid (e.g. spacer; please refer to entire document particularly Table 1).

For present claims 13-15, Peterson et al. teach gold SPR substrate (e.g. gold on glass; please refer to entire document particularly Materials and Methods section).

For present claim 16, Peterson et al. teach probes 25 base pairs in length (please refer to entire document particularly Table 1).

For present claim 17, Peterson et al. teach incubation at room temperature (e.g. 25°C; please refer to entire document particularly Materials and Methods).

The claims would have been obvious because "a person of ordinary skill has a good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product is not of innovation but of ordinary skill and common sense." The specific ratio between 40/60 and 60/40 is considered an experimental design choice. See *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

Therefore, the presently claimed invention is rendered *prima facie* obvious by the teachings of Peterson et al.

Arguments and Response

7. Applicants' arguments directed to the rejection under 35 USC 103 (a) as being unpatentable over Peterson et al. for claims 1-7, 9, and 11-18 were considered but are not persuasive for the following reasons.

Applicants contend that Peterson et al. do not teach "incubating the composition in contact with a surface of the solid phase substrate to immobilize the nucleic acid and the compound or the salt thereof on the solid phase substrate by co-adsorption". In addition, applicants contend that Peterson et al. does not teach co-adsorption of a nucleic acid and a compound or salt thereof of Formula I wherein the nucleic acid and compound are mixed before being contacted with the substrate. Applicants contend that Peterson et al. teach an embedding method (i.e. not co-adsorption) wherein the nucleic acids are added to the substrate and then a compound is added. Furthermore, applicants contend that Peterson et al. fail to teach a ratio of 40/60 to 60/40.

Applicants' arguments are not convincing since the teachings of Peterson et al. render the method of the instant claims *prima facie* obvious. Specifically, Peterson et al. teach adsorbing a duplex comprising a nucleic acid probe (i.e. ssDNA) and ssDNA-C6-SH (i.e. compound of formula HSC_6-nucleic acid or HS-L^1-L^2-R wherein L^1 is C_6, L^2 is a single bond, and R is natural hydroxyl on 3' end of nucleic acid) to a solid support (please refer to the entire reference particularly Table 1 and the Materials and Methods section). Therefore, the breadth of the presently claimed invention reads on adding a dsDNA comprising a HS-C_6 as a duplex to the solid support (i.e. co-adsorption; see Table 1 and "Immobilization procedure" section). The compound of formula I presently reads on the structure of HS-C_6-polynucleotide wherein L^1 is C_6, L^2 is a single bond, and R is natural hydroxyl on 3' end of nucleic acid. Therefore, if a HS-C_6-ssDNA is combined with a ssDNA to form a duplex (i.e. dsDNA) and the dsDNA comprising HS-C_6 is then added to the solid support (see Table 1 and "Immobilization procedure" section), a co-adsorption method which reads on the present invention is taught. "For duplex

immobilization, the double strand DNA-C6-SH film was immobilized as a pre-hybridized probe (ssDNA-C6-SH) and target (ssDNA) combination" (see the "Immobilization procedure" section, page 5164, lines 7-9).

Regarding the 40/60 to 60/40 ratio limitation, applicants are respectfully directed to MPEP § 2144.05, section II. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, it is noted that applicants disclosure states that the ratio can be from 1:99 to 99:1 depending on the desired density of nucleic acids on the surface (i.e. not critical; please refer to the present specification page 9).

8. Claims 1-7, 9, 11-13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi et al. U.S. Patent 6,855,551 filed April 12, 2001 (effective filing date September 18, 1998).

For present claims 1, 3-4, 6-7, 9, 11-12, Bawendi et al. teach methods of making semiconductor nanocrystals/quantum dots comprising (a) bringing a quantum dot (e.g. solid phase substrate) into contact with nucleic acid probes including HS-alkylene-PEG wherein alkylene is C_6 and a HS-alkylene-hydroxyl compound wherein the alkylene includes C_6 and (b) incubating the solid phase and the nucleic acid and HS-alkylene-hydroxyl compound (please refer to the entire specification particularly abstract; Figures 3-4, 6, 8-9; columns 4-14; Examples

1-10). Regarding the 40/60 to 60/40 ratio limitation, applicants are respectfully directed to MPEP § 2144.05, section II. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, it is noted that applicants disclosure states that the ratio can be from 1:99 to 99:1 depending on the desired density of nucleic acids on the surface (please refer to the present specification page 9).

For present claim 2, Bawendi et al. teach DNA and RNA (please refer to the entire specification particularly columns 4, 6-7, 9-14).

For present claim 5, Bawendi et al. teach polyethylene glycol (please refer to the entire specification particularly column 8).

For present claim 13, Bawendi et al. teach quantum dots made of metal (please refer to the entire specification particularly column 5; Examples 1-2).

For present claim 17, Bawendi et al. teach room temperature (e.g. 25°C; please refer to the entire specification particularly Examples 9-10).

The claims would have been obvious because "a person of ordinary skill has a good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product is not of innovation but of ordinary skill and common sense." The specific ratio between 40/60 and 60/40 is considered an experimental design choice. See *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

Therefore, the presently claimed invention is rendered *prima facie* obvious by the teachings of Bawendi et al.

Arguments and Response

9. Applicants' arguments directed to the rejection under 35 USC 103 (a) as being unpatentable over Bawendi et al. for claims 1-7, 9, and 11-17 were considered but are not persuasive for the following reasons. Please note: the arguments were for the 35 USC 102 rejection previously of record which is now a 35 USC 103 rejection based on the claim amendments.

Applicants contend that Bawendi et al. do not teach "incubating the composition in contact with a surface of the solid phase substrate to immobilize the nucleic acid and the compound or the salt thereof on the solid phase substrate by co-adsorption". In addition, applicants contend that Bawendi et al. do not teach a ratio from 40/60 to 60/40.

Bawendi et al. teach quantum dots including TOPO capped (CdSe)ZnS or MUA capped (CdSe)ZnS quantum dots (see Examples 1-2) wherein the reagents utilized for coating the quantum dots are mixed prior to addition to the quantum dots (e.g. protein/avidin + EDAC + NHS; see Example 3). In addition, Bawendi et al. teach mixing EDC and amine-labeled oligonucleotide then adding the mixture to quantum dots (i.e. co-adsorption; see Example 9). Furthermore, Bawendi et al. teach utilizing compounds of formula I as linkers (see Figures 4, 6, and 8-9).

Regarding the 40/60 to 60/40 ratio limitation, applicants are respectfully directed to MPEP § 2144.05, section II. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence

indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, it is noted that applicants disclosure states that the ratio can be from 1:99 to 99:1 depending on the desired density of nucleic acids on the surface (i.e. not critical; please refer to the present specification page 9).

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Future Communications

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amber D. Steele whose telephone number is (571)272-5538. The examiner can normally be reached on Monday through Friday 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Low can be reached on 571-272-0951. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Amber D. Steele/
Patent Examiner, Art Unit 1639

December 1, 2008